

Applicants also gratefully appreciate the courtesy extended to Applicants' attorney during the April 18 personal interview with Examiner Kang. During the personal interview, Examiner Kang indicated that the amendments appear to distinguish over Stern (U.S. Patent No. 5,771,321). The Examiner also briefly discussed Takeuchi ((U.S. Patent No. 6,323,833 B1) which was cited in the Office Action and is discussed in this Amendment.

Finally, the Examiner indicated that Fig. 13 of the application should be amended to include the "Related Art" label. Thus, Applicants amend Fig. 13 in the attached Request for Approval of Drawing Corrections.

✓ The Office Action objects to claim 24 because of minor informalities. Applicants point out that dependent claim 4 was amended in the Preliminary Amendment filed on January 12, 2000 to correct any insufficient antecedent basis. Accordingly, Applicants respectfully request that the objection to claim 24 be withdrawn.

✓ The Office Action rejects to the specification because of minor informalities. Applicants amend the specification to correct the minor informalities. Accordingly, Applicants respectfully request that the objection to the specification be withdrawn.

✓ The Office Action rejects claims 1-24 and 27 under 35 U.S.C. §103(a) as being unpatentable over Stern (U.S. Patent No. 5,771,321). Applicants respectfully traverse the rejection.

In particular, Applicants assert that neither Stern nor Takeuchi disclose or suggest a micromachine, including at least a first microstructure portion, and a second microstructure portion of a predetermined shape, at least a part of which is formed by mold transfer, the second microstructured portion being driven by the first microstructured portion to cause substantially all reflected light to travel in a direction almost perpendicular to an area between the first and second microstructured portions, as recited in independent claim 1, and similarly recited in independent claim 11.

Specifically, Stern discloses a mechanical like tap element 24 that includes a suspended beam 28 and a light storage plate 12. See Figs. 3A-C. When the suspended beam 28 is held separated from a storage plate mesa 26, light 16 in the storage plate 12 remains trapped in the storage plate 12 due to total internal reflection. See col. 7, lines 35-64. Movement of the suspended beam 28 into close contact with a top surface 34 of the storage plate mesa 26 results in relative matching of the internal index of refraction of the storage plate 12 and the index of refraction external to the storage plate at the location of the storage plate contact area.

This condition negates the state of total internal reflection at the location of the contact area and results in the escape of light from the storage plate 12 into the suspended beam 28. See Fig. 3B. Light escaping into the tap propagates through the thickness of the tap and impinges on the reflective back-scatter surface 32 of the tap, where the light is reflected back in various directions through the tap toward the light storage plate 12 and into the storage plate. The surface irregularities of the back-scatter surface 32 are preferably a geometry such that light re-entering the light storage plate 12 is angled once in the plate, at an angle less than the critical angle  $\theta_c$  defined by Snell's law for the given storage plate material.

Takeuchi discloses that the light 10, which has arrived at the surface of the displacement transmitting section 32, is reflected by the surface of the displacement transmitting section 32 and it behaves as *scattered* light. See col. 21, lines 11-39.

In stark contrast to Applicants claimed invention, neither Stern nor Takeuchi disclose or suggest a micromachine, including at least a second microstructure portion of a predetermined shape, at least a part of which is formed by mold transfer, the second microstructured portion being driven by the first microstructured portion to cause substantially all reflected light to travel in a direction almost perpendicular to an area between the first and second microstructured portions.

On the contrary, Stern clearly shows in Figs. 3A-C that the surface irregularities of the back-scatter surface 32 cause the light to reflect in various directions according to the critical angle  $\theta_c$ . Thus, Stern fails to cause substantially all reflected light to travel in a direction almost perpendicular to an area between the suspended beam 28 and the light storage plate 12.

Moreover, because Takeuchi does not disclose a second microstructured portion of a predetermined shape, i.e., a switching portion formed by at least mold transfer, the light 10 in Takeuchi is reflected as scattered light. Thus, the light 10 in Takeuchi cannot be substantially reflected to travel in a direction almost perpendicular to an area between the optical waveguide plate 12 and the displacement transmitting section 32.

Accordingly, because both Stern and Takeuchi fail to disclose these features, neither Stern nor Takeuchi can provide a micromachine suitable for a spatial light modulator having a device operative to modulate light by moving and controlling a microswitch portion with a high accuracy surface. Thus, Applicants assert that it would not have obvious to modify Stern or Takeuchi to arrive at the claimed invention.

Accordingly, Applicants assert that independent claims 1 and 11 define patentable subject matter. Claims 2-10 and 12-27 depend from the independent claims and therefore also define patentable subject matter. Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. §103(a) be withdrawn.

In view of the foregoing, Applicants submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-27 are earnestly solicited.

Should the Examiner believe that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' attorney at the telephone number listed below.

Respectfully submitted,



James A. Oliff  
Registration No. 27,075

Richard S. Elias  
Registration No. 48,806

JAO:RSE/ala

Attachments:

Appendix  
Request for Approval of Drawing Corrections with Fig. 13  
Petition for Extension of Time

Date: May 14, 2002

**OLIFF & BERRIDGE, PLC**  
**P.O. Box 19928**  
**Alexandria, Virginia 22320**  
**Telephone: (703) 836-6400**

<p>DEPOSIT ACCOUNT USE AUTHORIZATION Please grant any extension necessary for entry; Charge any fee due to our Deposit Account No. 15-0461</p>
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## APPENDIX

## Changes to Specification:

Page 19, lines 17-21:

Next, a method of manufacturing the spatial light modulator ~~111~~110 is described hereunder with particular emphasis on the optical switching elements 100. Especially, the drive portion 140 and the switching portion 130 of the optical switching elements 100 are manufactured by performing the micromachine manufacturing method of the present invention, which is described in detail hereinbelow.

## Changes to Claims:

The following is a marked-up version of the amended claims:

1. (Twice Amended) A micromachine comprising:
  - a first microstructured portion; and
  - a second microstructured portion of a predetermined shape, at least a part of which is formed by mold transfer, the second microstructured portion being driven by the first microstructured portion to cause substantially all reflected light to travel in a direction almost perpendicular to an area between the first and second microstructured portions.
11. (Twice Amended) A micromachine manufacturing method for manufacturing a micromachine, in which a first microstructured portion is operative to drive a second microstructured portion of a predetermined shape, the method comprising:
  - a first microstructured portion providing step of providing a first microstructured portion; and
  - a molding step of forming at least a part of said second microstructured portion on said first microstructured portion by mold transfer, after said first microstructured portion is provided so that substantially all reflected light travels in a direction almost perpendicular to an area between the first and second microstructured portions.